

RIPARIAN ISSUE PAPER

LACK OF FEDERAL SECTION 404 CLEAN WATER ACT PROTECTION OF
RIPARIAN AREAS IN THE ARID AND SEMI-ARID SOUTHWEST

Submitted by Arizona Ecological Services Office
US Fish and Wildlife Service
October 1993

ABSTRACT

Under the authority of the Clean Water Act (Act), jurisdictional waters of the United States are determined by the presence of adjacent wetlands as delineated by the Corps of Engineers Wetlands Delineation Manual (Manual). If adjacent wetlands are lacking, then jurisdictional waters are determined by the ordinary high water mark. However, southwestern riparian areas currently lack Federal protection under authority of the Act because they do not: (1) regularly meet all three criteria for adjacent wetlands specified in the Manual; and (2) they are frequently not protected by the Army Corps of Engineers ordinary high water (OHW) mark determination. The OHW is the line along a bank that is created by fluctuating water levels.

Jurisdictional delineations based upon OHW determinations are of concern because they are not based upon a specific flood year event; therefore, the geographic boundaries of a given delineation may vary significantly depending upon the volume of the flood event occurring prior to the determination. In addition, unless an OHW determination is made after a large flood, much of the Southwest's riparian habitat is considered non-jurisdictional. Due to this lack of Federal protection for southwestern riparian habitats, the chemical, physical, and biological integrity of many of the streams and rivers in this region is not being adequately maintained and protected.

Scientific data indicate riparian habitats in the Southwest function as wetlands which protect the integrity of the Nation's waters. In addition, southwestern riparian areas conform with the term "waters of the United States" as defined in the Environmental Protection Agency's Section 404(b)(1) Guidelines and the Army Corps of Engineers' Regulations.

Several recommendations are made for implementing Federal protection for this valuable habitat in the Southwest.

RIPARIAN FUNCTIONS

Extensive scientific data indicate southwestern riparian areas provide the necessary functions to meet the objective of the Clean Water Act (Act) to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Thus, these riparian areas should receive appropriate protection as provided through Section 404 of the Act for jurisdictional wetlands based upon their functional importance.

Although there are many definitions for riparian systems, we have chosen to use the terminology utilized for the U.S. Fish and Wildlife Service's National Wetland Inventory maps which have been expanded in Arizona to include riparian areas. For the purposes of this issue paper we define riparian systems as habitats or ecosystems that are associated with bodies of water or are dependent upon the existence of perennial or intermittent surface or subsurface water drainage. They include the aquatic ecosystem and the transitional area between the aquatic and terrestrial ecosystems, encompassing both vegetated and non-vegetated areas. Riparian plant communities include mixed broadleaf species (i.e. ash, alder, sycamore, boxelder, etc.), cottonwood-willow associations, salt cedar, and mesquite.

Southwestern riparian areas provide functions associated with wetland areas influenced by a longer, less variable hydroperiod which protect the chemical and physical integrity of our Nation's waters (i.e. ground water recharge and discharge, floodflow alteration, sediment stabilization, nutrient retention/transformation, and production export). For example, a recent functional assessment of the Verde River riparian corridor in Arizona indicated that all of these functions occurred in at least 50% of each reach when the river supported riparian habitat characterized by broad dense stands of multi-strata riparian vegetation (Sullivan and Richardson 1993).

By increasing water retention time and lateral recharge into the floodplain, riparian vegetation plays an important role in enhancing spatial and temporal aspects of groundwater recharge and discharge (Stromberg 1991 unpubl.). Riparian areas contribute to floodflow alteration by reducing flow velocity (Buer et al. 1988) and increasing surface roughness (Lisle 1988). Southwestern riparian areas provide sediment stabilization by trapping fine sediment and organic debris, add root strength to bed material, and reduce local shear stress through added roughness (Groeneveld and Griepentrog 1985, Lisle 1988, and Buer et al. 1988).

Nutrient cycling in riparian ecosystems can control nutrient transport and influence water quality. Riparian ecosystems, particularly those supporting broad, multi-strata stands of riparian vegetation, provide buffer zones between terrestrial and

aquatic ecosystems where excessive nutrients and sediments from adjacent upland areas may be trapped and assimilated before they reach sensitive aquatic environments (Brinson et al. 1981, Lowrence et al. 1984, and Rhodes et al. 1985). In addition, particulate organic material deposited in surface waters from the adjacent riparian areas provides a critical source of nutrients for a substantial portion of the aquatic biota (Lamberti et al. 1988) and maintains an important food base for the aquatic and terrestrial food chain.

Southwestern riparian areas also contribute significantly to the biological integrity, including biodiversity, of our Nation's waters. Riparian areas are renowned for their species abundance and diversity (Brown et al. 1977, Rosenberg et al. 1991). Breeding birds have higher densities in cottonwood-willow forests than in any other habitat in the Southwest, with values often exceeding those in mesic regions (Brinson et al. 1981). For example, Carothers and Johnson (1970) found breeding bird densities in some cottonwood stands along the Verde River in central Arizona in excess of 1,000 pairs per 100 acres. They also found that 19 species (56.4% of total nesting birds) nesting in the cottonwood areas of the Verde Valley have natural habitats limited to riparian vegetation. Many of these species are neotropical migratory birds. In addition, 60 percent of the vertebrate species inhabiting three National Forests along the Verde River can be found along the river and in the immediate environs (Forest Service 1981).

Riparian ecosystems provide important habitat for many threatened, endangered, and candidate species including bald eagle, peregrine falcon, ferruginous hawk, southwestern willow flycatcher, Mexican garter snake, lowland leopard frog, Huachuca water umbel, and other plants. Numerous neotropical migratory birds are dependent upon this habitat type including flycatchers, vireos, warblers, orioles, tanagers, grosbeaks, and buntings. Similarly, these areas provide important migratory and wintering habitat for a diversity of waterfowl, wading birds, shorebirds, and other wetland wildlife. Riparian areas are often critical components of cold and warm water fisheries, ensuring critical water temperature regulation, habitat configuration and complexity, and directly and indirectly sustaining key food chain components.

THREATS TO RIPARIAN AREAS

A significant amount of the riparian habitat throughout the West has been degraded or destroyed by human activity leaving only fragmented remnants of decreased quality habitat. Primary threats include grazing, increased urbanization, sand and gravel operations, water diversions, and other water resource manipulation practices. As a result of this significant habitat modification and loss, the Nature Conservancy considers the

cottonwood-willow gallery riparian forest to be globally endangered and the rarest forest type in North America (Stromberg 1992, unpubl.). As riparian habitat is lost throughout the region, the functional capability of these areas decreases on both a small and large scale, resulting in a corresponding increased threat to the integrity of our waters.

APPLICABILITY TO EXISTING FEDERAL CLEAN WATER ACT REGULATIONS

Southwestern riparian areas also conform with the term "waters of the United States" as defined in the Environmental Protection Agency's (EPA) Section 404(b)(1) Guidelines (Guidelines) and the Army Corps of Engineers (Corps) Regulations (Section 320.4(b)(2) (Corps Regulations). However, not all riparian areas are currently protected under Section 404 either by OHW determinations or the Wetlands Delineation Manual (Manual). The definition of "waters of the United States" includes:

- (1) waters which are used in interstate or foreign commerce,
- (2) waters whereby the use, degradation or destruction of which could affect interstate or foreign commerce including:
 - (i) waters which are or could be used by interstate or foreign travelers for recreational or other purposes; or
 - (ii) from which fish are or could be taken or sold in interstate or foreign commerce.

As indicated above, southwestern riparian areas provide valuable habitat for many migratory waterfowl and neotropical birds. These species contribute to the economy of this region, not only through hunting of waterfowl, but they also contribute significantly to ecotourism. For example, birding contributes significantly to Arizona tourism, particularly in the southeastern portion of the State where birders can observe species whose range is otherwise limited to Mexico. The Nature Conservancy (TNC) indicated that ecotourism (e.g. bird watching, recreation, and support services) contributed approximately \$1.6 million to the Sierra Vista economy located in southeast Arizona between July, 1990 and June, 1992 (Crandall et al. 1992). Thus, loss or destruction of riparian areas not only adversely impacts the quantity and quality of wildlife habitats but also detrimentally influences interstate and foreign commerce.

Loss of riparian areas could also have a detrimental effect on water quality through loss of sediment stabilization, floodflow alteration, increased water temperature, and loss of habitat through alteration of channel morphology, thus adversely impacting fisheries.

Additional criteria within the EPA's Guidelines and the Corps Regulations which support protection of southwestern riparian areas through Section 404 include the following:

Guidelines - Section 230.1

- "The guiding principle [of these Guidelines and when discharge of dredged or fill material should be controlled] should be when the degradation or destruction of special aquatic sites may represent an irreversible loss of valuable aquatic resources."

Although riparian areas are not specifically defined as a special aquatic site in the Guidelines, there is sufficient scientific evidence which indicates that removal of riparian areas could have an irreversible impact on aquatic resources. As discussed above, the aquatic system is dependent upon riparian habitat for cover, food production, temperature moderation, bank stabilization, habitat configuration and complexity, and sediment and pollutant filtration. The status of Arizona's native fish community shows that the decline of the native fish population mirrors that of the riparian community. It is estimated that a significant portion of the native riparian areas along Arizona's major watercourses have been lost, altered, or degraded as a result of man's activities. In addition, of Arizona's 32 native freshwater fishes, 3% are already extinct, 56% are listed as endangered or threatened, and an additional 34% are being considered for listing as endangered or threatened. This decline is attributed to loss of water quantity and adjacent riparian habitat. The data indicate that we can not risk losing more of our southwestern riparian habitat, if we are to maintain these aquatic resources.

- Section 230.10 4(c) - No discharge of dredged or fill material shall be permitted which will cause or contribute to significant degradation of the waters of the United States. These include:
 - (2) "Significantly adverse effects of the discharge of pollutants on life stages of aquatic life and other wildlife dependent on aquatic ecosystems; or
 - (3) Significantly adverse effects of the discharge of pollutants on aquatic ecosystem diversity, productivity, and stability. Such effects may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients or purify water."

Removal or degradation of riparian habitat will decrease the rate of nutrient retention/transformation and sediment/toxicant retention provided by the riparian vegetation, thus, increasing the movement of pollutants into and within the aquatic ecosystem and decreasing the rate of nutrient removal/transformation. High nutrient or pollutant levels in the aquatic ecosystem may also directly result in decreased habitat quality for aquatic species and indirectly

for other wildlife dependent on aquatic ecosystems.

Corps Regulations - Section 320.4(b)(2)

- o "Wetlands considered to perform functions important to the public interest include:
 - (i) Wetlands which serve significant natural biological functions including food chain production, general habitat and nesting, spawning, rearing, and nesting sites for aquatic or land species; ...
 - (iii) Wetlands the destruction or alteration of which would affect detrimentally natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics; ...
 - (v) Wetlands which serve as valuable storage areas for storm and flood water;
 - (vi) Wetlands which are ground water discharge areas that maintain minimum base flows important to aquatic resources and those which are prime natural recharge areas;
 - (vii) Wetlands which serve significant water purification functions; and
 - (viii) Wetlands which are unique in nature or scarce in quantity to the region or local area."

As discussed above, southwestern riparian areas provide all of these functions associated with wetlands. The EPA has also identified riparian wetlands of the arid and semiarid West as inland wetlands (EPA 1988). The increasing importance of riparian habitat in the Southwest is also evident at the regional and state level. For example, symposiums with a wetland and riparian ecosystem emphasis are held at a minimum annually in the region. These are supported by all major Federal agencies and many national conservation organizations.

LACK OF PROTECTION FROM WETLAND'S MANUAL CRITERIA

Although scientific data indicate southwestern riparian areas function as wetlands in protecting our Nation's waters and there is sufficient evidence that this habitat type conforms with the term "waters of the United States," these riparian areas are frequently not protected under Section 404 because they do not regularly meet all three criteria specified in the Manual.

In contrast to eastern riparian areas, southwestern riparian areas are characterized by highly variable hydrologic patterns and geomorphic characteristics which reduce the potential for formation of hydric soils. Hydrologic conditions of the Southwest are typified by extreme events and have large temporal and spatial variation. Magnitude and intensity of inundation, rather than duration of inundation, are the most relevant hydrologic criteria that affect ecosystem biodiversity. Riparian

areas are seasonally inundated with water, but due to the variable hydrologic regime, many areas are only inundated for a short duration. Riparian ecosystems of the Southwest are also water limited, maintained by influent (losing) streams, whereas riparian ecosystems of eastern and other more mesic areas are nutrient limited, occurring along effluent streams, i.e. streams that gain water from the adjacent water table (Johnson and Carothers 1982). These hydrologic conditions frequently do not satisfy the hydrology, as well as hydric soil criteria, in the Manual.

Southwestern riparian areas are predominantly supported by Entisol soils. These are young, alluvial sandy soils, often of recent deposition, with low organic matter and clay content. They are frequently of coarse texture, have low water holding capacity, and they lack well defined horizons or typical hydric soil characteristics. These soil conditions, coupled with low periodicity flooding, significantly reduce the potential for hydric soils to form.

Similar to palustrine forested swamps and bottomland hardwoods in the southeastern United States, riparian areas function as the transition zone between the drier uplands and the water. Although southwestern riparian areas lack soil and hydrology wetland characteristics of more mesic areas, they are typically dominated by obligate and facultative wetland vegetation species (i.e. Fremont cottonwood (*Populus fremontii*), narrow-leaf cottonwood (*P. angustifolia*), Arizona alder (*Alnus oblongifolia*), Goodding willow (*Salix gooddingii*), Arizona sycamore (*Platanus wrightii*), Box elder (*Acer negundo*), Arizona walnut (*Juglans major*), Arroyo willow (*S. lasiolepis*), Sandbar willow (*S. exigua*), and seep willow (*Baccharis glutinosa*)) as defined by the Fish and Wildlife Service in the "National List of Plant Species that Occur in Wetlands" (Reed 1988). Thus, indicating that these areas are dominated by vegetation typically adapted for life in saturated soil conditions. However, presence of these saturated soil conditions may not always be readily apparent.

Establishment of riparian tree species follows an orderly progression from creation of a favorable seedbed in the moist soils adjacent to the active channel, to nursery-bars, to mature stands on aggraded benches. These aggraded benches may be five feet or more above the active channel but the root crowns remain near the water table. Although these species germinate in jurisdictional waters, by the time they reach maturity they are located on aggraded terraces which are physically outside the active channel but remain dependent upon hydrologic conditions within the floodplain. Therefore, dominant vegetation species within the riparian ecosystem are unified by their dependence on seasonal or perennial surface or subsurface waters throughout their life cycle.

Figure 1 depicts a typical cottonwood-willow riparian corridor along the Verde River in central Arizona which often lacks jurisdictional wetlands as these areas frequently do not support evidence of all three criteria. Although this area is dominated by seep willow, Fremont cottonwood, and Goodding willow, it does not support hydric soils due to the predominance of Entisols.

Evidence of the presence of wetland hydrology (i.e. in this area, stream gage data and drift lines) extends to the outer edge of the first terrace. However, due to the highly variable hydrologic characteristics of the Southwest, the first terrace may not consistently provide sufficient evidence of wetland hydrology over time. As indicated in Figure 1, none of the riparian habitat supporting mid-age to mature woody riparian vegetation would be determined to be jurisdictional wetlands or waters of the United States because these areas typically lack the required soil and hydrology characteristics discussed in the Manual. However, these areas continue to support vegetation which is dependent upon and adapted to saturated soil conditions and which provides important functions for maintaining the integrity of the region's waters.



Area typically lacking
wetland soil and
hydrology criteria and
above OHW.

Area below OHW but
lacking wetland
soil criterion.

Area typically
lacking wetland
soil and
hydrology
criteria and
above OHW.

Figure 1 - Cottonwood-Willow Forest and Mesquite Bosque in the Southwest

LACK OF PROTECTION FROM ORDINARY HIGH WATER DETERMINATIONS

The ordinary high water (OHW) mark is the line along a bank that is created by fluctuating water levels. Field indicators to determine OHW include scour lines, shelving, changes in the character of soil, the presence of litter and debris, and the destruction of terrestrial vegetation. Jurisdictional delineations based upon OHW determinations are of concern in Arizona, because they are not based upon a specific flood year event; therefore, the geographic boundaries of a specific delineation may vary significantly depending upon the volume of the flood event occurring prior to the determination. For example, jurisdictional delineations made succeeding a small flood year event (e.g. 2-year flood event) will be significantly lower than a delineation made succeeding a 50 or 100 year flood event. An OHW determination is only valid for three years unless a major event alters the channel geomorphology; therefore, the Corps is also not restricted from making multiple determinations along a given water body over the course of several floods for different projects. There is also inconsistency within the Corps as to where the OHW mark occurs along a given waterbody. Thus, the extent to which the chemical, physical, and biological integrity of the adjacent waters is maintained through protection of riparian habitat will be influenced by the volume of the most recent flood event relative to when the determination is made. This problem is exacerbated by an inconsistency within the Corps regarding where jurisdictional limits would occur for a given water body at a set point in time.

The OHW line in Figure 1 indicates that the second terrace, dominated by obligate and facultative wetland species, is also not protected by this determination.

RECOMMENDATIONS

We recommend several alternatives for implementing Federal protection for riparian habitat in the Southwest:

- (1) develop a Regional Manual;
- (2) work with the EPA and the Corps to develop more clearly defined criteria for determining ordinary high water; or
- (3) within the context of the Manual, define this habitat type as a wetland that is an exception to the three criteria or as a problem wetland.

Development of a Regional Manual for the Southwest, inclusive of the riparian areas as defined by the National Wetland Inventory maps for Arizona, would provide Federal regulatory criteria for delineating riparian areas along perennial and intermittent streams which, by performing as functional wetlands, would meet the objective of the Act to maintain the chemical, physical, and biological integrity of our Nation's waters. Although non-

regulatory approaches, such as Advanced Identifications, could be adopted for riparian areas, we are concerned that these areas would continue to be inadequately protected without Federal regulation.

In accordance with the Corps Regulations, OHW determinations are made for jurisdictional delineations when adjacent wetlands are not present. We recommend that the Service work with the Corps in developing further guidelines for making OHW determinations based on specific flood return event(s) which provide adequate protection of southwestern riparian areas, such that the objective of the Act is met.

The proposed 1991 Manual references wetlands (e.g. prairie potholes, playas, vernal pools, and pocosins) that are exceptions to the three criteria. We recommend that a similar approach be adopted for southwestern riparian areas. The problem wetlands recognized in the proposed 1991 Manual are characterized by high seasonal and annual variance in water availability, as is true for southwestern riparian areas. In addition, prairie potholes and playas are associated with arid and semiarid regions.

The 1991 Manual states that "wetland hydrology [of playas] is best characterized by examining hydrological indicators over a multi-year period." Such an approach should be taken with southwestern riparian areas. Examination of hydrologic characteristics over a time period of up to 10 years would reveal that many riparian areas would meet the hydrologic criteria of the Manual.

Southwestern riparian areas are more constant from the vegetation criteria than some of these other problem wetlands, such as vernal pools. Vernal pools, for example, are frequently characterized by a seasonal flux of wetland vegetation, ranging from obligate wetland species to facultative upland depending upon the time of year. The highly variable hydrology of prairie potholes also results in the invasion of facultative, facultative upland, and upland plant species. In contrast, southwestern riparian areas are typically characterized by a constant feature of obligate or facultative wetland species. Because southwestern riparian areas perform as functional wetlands and meet the objective of the Act, as do these problem wetlands, regional criteria should be developed for this habitat type.

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